AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Canceled)
2. (Canceled)
3. (Canceled)
4. (Canceled)
5. (Canceled)
6. (Canceled)
7. (Canceled)
8. (Canceled)
9. (Canceled)
10. (Canceled)

11. (New) An image optical system in which a plurality of light beams emerging from an image-forming device on a conjugate plane A and having a divergence angle of 10° or greater is made obliquely incident upon a conjugate plane B to form on the conjugate plane B an enlarged image approximately similar to an image formed by the image-forming device, said image optical system comprising:

a first optical system and a second optical system,

the first optical system including a plurality of optical elements having a axis of rotation symmetry and having the function of converging the plurality of light beams emerging from the image-forming device on both of a first light beam cross section parallel to principal rays and a second light beam cross section intersecting the first light beam cross section, the optical elements are decentered,

the second optical system including optical elements having the function of converging light

beams passing through the first optical system on the conjugate plane B,

the first optical system having a first reference axis passing through a position nearer to a light beam traveling through the shortest optical path from the conjugate plane A to the conjugate plane B than to a light beam traveling through the longest optical path from the conjugate plane A to the conjugate plane B, the first reference axis being perpendicular to the conjugate plane A,

the second optical system having a second reference axis passing through a position nearer to a light beam traveling through the shortest optical path from the conjugate plane A to the conjugate plane B than to a light beam traveling through the longest optical path from the conjugate plane A to the conjugate plane B, the second reference axis being perpendicular to the conjugate plane B,

the image optical system satisfying the following relationships:

(I) $S1 \leq L11 \leq S1 + S2$

(ii) $S1 \leq L21 \leq S1 + S2$

(iii) $L11/L1n < 0.25$

(iv) $0 < L21/L2n < 1.5$

wherein S1 is the distance from the point of emergence on the first optical system to the point of incidence on the second optical system along the first reference axis;

wherein S2 is the distance from the point of emergence on the second optical system to the conjugate plane B along the second reference axis;

wherein the maximum and minimum of the distance between a point of convergence in the first and second light beam cross sections of a light beam emerging from the first optical system at a point nearest to the first reference axis and the point of emergence on the first optical system are L11 and L21, respectively;

wherein the maximum and minimum of the distance between the point of convergence in the first and second light beam cross sections of a light beam emerging from the first optical system at a point remotest from the first reference axis and the point of emergence on the first optical system are L1n and L2n.

12.(New) An image optical system in which a plurality of light beams emerging from an image-forming device on a conjugate plane A and having a divergence angle of 10° or greater is made obliquely incident upon a conjugate plane B to form on the conjugate plane B an enlarged image approximately similar to an image formed by the image-forming device, said image optical system comprising:

a first optical system and a second optical system,

the first optical system having a plurality of optical elements having a axis of rotation symmetry and having the function of converging the plurality of light beams emerging from the image-forming device on both of a first light beam cross section parallel to principal rays and a second light beam cross section intersecting the first light beam cross section, the optical elements are decentered,

the second optical system including optical elements having the function of converging light beams passing through the first optical system on the conjugate plane B,

the first optical system having a first reference axis passing through a position nearer to a light beam traveling through the shortest optical path from the conjugate plane A to the conjugate plane B than to a light beam traveling through the longest optical path from the conjugate plane A to the conjugate plane B, the first reference axis being perpendicular to the conjugate plane A,

the second optical system having a second reference axis passing through a position nearer to a light beam traveling through the shortest optical path from the conjugate plane A to the conjugate plane B than to a light beam traveling through the longest optical path from the conjugate plane A to the conjugate plane B, the second reference axis being perpendicular to the conjugate plane B,

the image optical system satisfying the following relationships:

(i) $S1 \leq L11 \leq S1 + S2$

(ii) $S1 \leq L21 \leq S1 + S2$

(iii) $L11/L1n < 0.25$

(iv) $0 < L21/L2n < 1.5$

(v) $D1 < D2$

wherein S1 is the distance from the point of emergence on the first optical system to the point of incidence on the second optical system along the first reference axis;

wherein S2 is the distance from the point of emergence on the second optical system to the conjugate plane B along the second reference axis;

wherein the maximum and minimum of the distance between a point of convergence in the first and second light beam cross sections of a light beam emerging from the first optical system at a point nearest to the first reference axis and the point of emergence on the first optical system are L11 and L21, respectively;

wherein the maximum and minimum of the distance between the point of convergence in the first and second light beam cross sections of a light beam emerging from the first optical system at a point remotest from the first reference axis and the point of emergence on the first optical system are L1n and L2n, respectively;

wherein D1 is the distance along an arbitrary light beam from the first optical system to the second optical system; and

wherein D2 is the distance along the arbitrary light beam from the second optical system to the conjugate plane B.

13. (New) An image optical system in which a plurality of light beams emerging from an image-forming device on a conjugate plane A and having a divergence angle of 10° or greater is made obliquely incident upon a conjugate plane B to form on the conjugate plane B an enlarged image approximately similar to an image formed by the image-forming device, said image optical system comprising:

a first optical system and a second optical system,

the first optical system having a plurality of optical elements having a axis of rotation symmetry and having the function of converging the plurality of light beams emerging from the image-forming device on both of a first light beam cross section parallel to principal rays and a second light beam cross section intersecting the first light beam cross section, the optical elements

are decentered,

the second optical system including optical elements having the function of converging light beams passing through the first optical system on the conjugate plane B,

the first optical system having a first reference axis passing through a position nearer to a light beam traveling through the shortest optical path from the conjugate plane A to the conjugate plane B than to a light beam traveling through the longest optical path from the conjugate plane A to the conjugate plane B, the first reference axis being perpendicular to the conjugate plane A,

the second optical system having a second reference axis passing through a position nearer to a light beam traveling through the shortest optical path from the conjugate plane A to the conjugate plane B than to a light beam traveling through the longest optical path from the conjugate plane A to the conjugate plane B, the second reference axis being perpendicular to the conjugate plane B,

the image optical system satisfying the following relationships:

(i) $S1 \leq L11 \leq S1 + S2$

(ii) $S1 \leq L21 \leq S1 + S2$

(iii) $L11/L1n < 0.25$

(iv) $0 < L21/L2n < 1.5$

(v) at least one of conditions expressed by

(a) $S1/L11 > 0.6$

(b) $(S1 + S2)/L2n < 1$

(c) $\Delta SL > 0.6$

wherein S1 is the distance from the point of emergence on the first optical system to the point of incidence on the second optical system along the first reference axis;

wherein S2 is the distance from the point of emergence on the second optical system to the conjugate plane B along the second reference axis;

wherein the maximum and minimum of the distance between a point of convergence in the first and second light beam cross sections of a light beam emerging from the first optical system at a point nearest to the first reference axis and the point of emergence on the first optical system are

L11 and L21, respectively;

wherein the maximum and minimum of the distance between the point of convergence in the first and second light beam cross sections of a light beam emerging from the first optical system at a point remotest from the first reference axis and the point of emergence on the first optical system are L1n and L2n, respectively; and

wherein ΔSL is the difference between the maximum and minimum of the ratio S1/L1 of the distance L1 and the distance S1.

14. (New) An image optical system in which a plurality of light beams emerging from an image-forming device on a conjugate plane A and having a divergence angle of 10° or greater is made obliquely incident upon a conjugate plane B to form on the conjugate plane B an enlarged image approximately similar to an image formed by the image-forming device, said image optical system comprising:

a first optical system and a second optical system,

the first optical system having a plurality of optical elements having a axis of rotation symmetry and having the function of converging the plurality of light beams emerging from the image-forming device on both of a first light beam cross section parallel to principal rays and a second light beam cross section intersecting the first light beam cross section, the optical elements are decentered,

the second optical system including optical elements having the function of converging light beams passing through the first optical system on the conjugate plane B,

the first optical system having a first reference axis passing through a position nearer to a light beam traveling through the shortest optical path from the conjugate plane A to the conjugate plane B than to a light beam traveling through the longest optical path from the conjugate plane A to the conjugate plane B, the first reference axis being perpendicular to the conjugate plane A,

the second optical system having a second reference axis passing through a position nearer to a light beam traveling through the shortest optical path from the conjugate plane A to the conjugate

plane B than to a light beam traveling through the longest optical path from the conjugate plane A to the conjugate plane B, the second reference axis being perpendicular to the conjugate plane B,

the image optical system satisfying the following relationships:

(i) $S1 \leq L11 \leq S1 + S2$

(ii) $S1 \leq L21 \leq S1 + S2$

(iii) $L11/L1n < 0.25$

(iv) $0 < L21/L2n < 1.5$

(v) $D1 < D2$

(vi) at least one of conditions expressed by:

(a) $S1/L11 > 0.6$

(b) $(S1 + S2)/L2n < 1$

(c) $\Delta SL > 0.6$

wherein S1 is the distance from the point of emergence on the first optical system to the point of incidence on the second optical system along the first reference axis;

wherein S2 is the distance from the point of emergence on the second optical system to the conjugate plane B along the second reference axis;

wherein the maximum and minimum of the distance between a point of convergence in the first and second light beam cross sections of a light beam emerging from the first optical system at a point nearest to the first reference axis and the point of emergence on the first optical system are L11 and L21, respectively;

wherein the maximum and minimum of the distance between the point of convergence in the first and second light beam cross sections of a light beam emerging from the first optical system at a point remotest from the first reference axis and the point of emergence on the first optical system are L1n and L2n, respectively;

wherein D1 is the distance along an arbitrary light beam from the first optical system to the second optical system;

wherein D2 is the distance along the arbitrary light beam from the second optical system to

the conjugate plane B; and

wherein ΔSL is the difference between the maximum and minimum of the ratio S1/L1 of the distance L1 and the distance S1.

15. (New) An image optical system in which a plurality of light beams emerging from an image-forming device on a conjugate plane A and having a divergence angle of 10° or greater is made obliquely incident upon a conjugate plane B to form on the conjugate plane B an enlarged image approximately similar to an image formed by the image-forming device, said image optical system comprising:

a first optical system and a second optical system,

the first optical system including a plurality of optical elements having a axis of rotation symmetry and having the function of converging the plurality of light beams emerging from the image-forming device on both of a first light beam cross section parallel to principal rays and a second light beam cross section intersecting the first light beam cross section, the optical elements having no common optical axis,

the second optical system including optical elements having the function of converging light beams passing through the first optical system on the conjugate plane B,

the first optical system having a first reference axis passing through a position nearer to a light beam traveling through the shortest optical path from the conjugate plane A to the conjugate plane B than to a light beam traveling through the longest optical path from the conjugate plane A to the conjugate plane B, the first reference axis being perpendicular to the conjugate plane A,

the second optical system having a second reference axis passing through a position nearer to a light beam traveling through the shortest optical path from the conjugate plane A to the conjugate plane B than to a light beam traveling through the longest optical path from the conjugate plane A to the conjugate plane B, the second reference axis being perpendicular to the conjugate plane B,

the image optical system satisfying the following relationships:

(i) $S1 \leq L11 \leq S1 + S2$

(ii) $S1 \leq L21 \leq S1 + S2$

(iii) $L11/L1n < 0.25$

(iv) $0 < L21/L2n < 1.5$

wherein S1 is the distance from the point of emergence on the first optical system to the point of incidence on the second optical system along the first reference axis;

wherein S2 is the distance from the point of emergence on the second optical system to the conjugate plane B along the second reference axis;

wherein the maximum and minimum of the distance between a point of convergence in the first and second light beam cross sections of a light beam emerging from the first optical system at a point nearest to the first reference axis and the point of emergence on the first optical system are L11 and L21, respectively;

wherein the maximum and minimum of the distance between the point of convergence in the first and second light beam cross sections of a light beam emerging from the first optical system at a point remotest from the first reference axis and the point of emergence on the first optical system are L1n and L2n.

16. (New) An image optical system in which a plurality of light beams emerging from an image-forming device on a conjugate plane A and having a divergence angle of 10° or greater is made obliquely incident upon a conjugate plane B to form on the conjugate plane B an enlarged image approximately similar to an image formed by the image-forming device, said image optical system comprising:

a first optical system and a second optical system,

the first optical system having a plurality of optical elements having a axis of rotation symmetry and having the function of converging the plurality of light beams emerging from the image-forming device on both of a first light beam cross section parallel to principal rays and a second light beam cross section intersecting the first light beam cross section, the optical elements having no common optical axis,

the second optical system including optical elements having the function of converging light beams passing through the first optical system on the conjugate plane B,

the first optical system having a first reference axis passing through a position nearer to a light beam traveling through the shortest optical path from the conjugate plane A to the conjugate plane B than to a light beam traveling through the longest optical path from the conjugate plane A to the conjugate plane B, the first reference axis being perpendicular to the conjugate plane A,

the second optical system having a second reference axis passing through a position nearer to a light beam traveling through the shortest optical path from the conjugate plane A to the conjugate plane B than to a light beam traveling through the longest optical path from the conjugate plane A to the conjugate plane B, the second reference axis being perpendicular to the conjugate plane B,

the image optical system satisfying the following relationships:

(i) $S1 \leq L11 \leq S1 + S2$

(ii) $S1 \leq L21 \leq S1 + S2$

(iii) $L11/L1n < 0.25$

(iv) $0 < L21/L2n < 1.5$

(v) $D1 < D2$

wherein S1 is the distance from the point of emergence on the first optical system to the point of incidence on the second optical system along the first reference axis;

wherein S2 is the distance from the point of emergence on the second optical system to the conjugate plane B along the second reference axis;

wherein the maximum and minimum of the distance between a point of convergence in the first and second light beam cross sections of a light beam emerging from the first optical system at a point nearest to the first reference axis and the point of emergence on the first optical system are L11 and L21, respectively;

wherein the maximum and minimum of the distance between the point of convergence in the first and second light beam cross sections of a light beam emerging from the first optical system at a point remotest from the first reference axis and the point of emergence on the first optical system

are L1n and L2n, respectively;

wherein D1 is the distance along an arbitrary light beam from the first optical system to the second optical system;

wherein D2 is the distance along the arbitrary light beam from the second optical system to the conjugate plane B.

17. (New) An image optical system in which a plurality of light beams emerging from an image-forming device on a conjugate plane A and having a divergence angle of 10° or greater is made obliquely incident upon a conjugate plane B to form on the conjugate plane B an enlarged image approximately similar to an image formed by the image-forming device, said image optical system comprising:

a first optical system and a second optical system,

the first optical system having a plurality of optical elements having a axis of rotation symmetry and having the function of converging the plurality of light beams emerging from the image-forming device on both of a first light beam cross section parallel to principal rays and a second light beam cross section intersecting the first light beam cross section, the optical elements having no common optical axis,

the second optical system including optical elements having the function of converging light beams passing through the first optical system on the conjugate plane B,

the first optical system having a first reference axis passing through a position nearer to a light beam traveling through the shortest optical path from the conjugate plane A to the conjugate plane B than to a light beam traveling through the longest optical path from the conjugate plane A to the conjugate plane B, the first reference axis being perpendicular to the conjugate plane A,

the second optical system having a second reference axis passing through a position nearer to a light beam traveling through the shortest optical path from the conjugate plane A to the conjugate plane B than to a light beam traveling through the longest optical path from the conjugate plane A to the conjugate plane B, the second reference axis being perpendicular to the conjugate plane B,

the image optical system satisfying the following relationships:

(i) $S1 \leq L11 \leq S1 + S2$

(ii) $S1 \leq L21 \leq S1 + S2$

(iii) $L11/L1n < 0.25$

(iv) $0 < L21/L2n < 1.5$

(v) at least one of conditions expressed by

(a) $S1/L11 > 0.6$

(b) $(S1 + S2)/L2n < 1$

(c) $\Delta SL > 0.6$

wherein S1 is the distance from the point of emergence on the first optical system to the point of incidence on the second optical system along the first reference axis;

wherein S2 is the distance from the point of emergence on the second optical system to the conjugate plane B along the second reference axis;

wherein the maximum and minimum of the distance between a point of convergence in the first and second light beam cross sections of a light beam emerging from the first optical system at a point nearest to the first reference axis and the point of emergence on the first optical system are L11 and L21, respectively;

wherein the maximum and minimum of the distance between the point of convergence in the first and second light beam cross sections of a light beam emerging from the first optical system at a point remotest from the first reference axis and the point of emergence on the first optical system are L1n and L2n, respectively;

wherein ΔSL is the difference between the maximum and minimum of the ratio S1/L1 of the distance L1 and the distance S1.

18. (New) An image optical system in which a plurality of light beams emerging from an image-forming device on a conjugate plane A and having a divergence angle of 10° or greater is made obliquely incident upon a conjugate plane B to form on the conjugate plane B an enlarged image

approximately similar to an image formed by the image-forming device, said image optical system comprising:

a first optical system and a second optical system,

the first optical system having a plurality of optical elements having a axis of rotation symmetry and having the function of converging the plurality of light beams emerging from the image-forming device on both of a first light beam cross section parallel to principal rays and a second light beam cross section intersecting the first light beam cross section, the optical elements having no common optical axis,

the second optical system including optical elements having the function of converging light beams passing through the first optical system on the conjugate plane B,

the first optical system having a first reference axis passing through a position nearer to a light beam traveling through the shortest optical path from the conjugate plane A to the conjugate plane B than to a light beam traveling through the longest optical path from the conjugate plane A to the conjugate plane B, the first reference axis being perpendicular to the conjugate plane A,

the second optical system having a second reference axis passing through a position nearer to a light beam traveling through the shortest optical path from the conjugate plane A to the conjugate plane B than to a light beam traveling through the longest optical path from the conjugate plane A to the conjugate plane B, the second reference axis being perpendicular to the conjugate plane B,

the image optical system satisfying the following relationships:

(i) $S1 \leq L11 \leq S1 + S2$

(ii) $S1 \leq L21 \leq S1 + S2$

(iii) $L11/L1n < 0.25$

(iv) $0 < L21/L2n < 1.5$

(v) $D1 < D2$

(vi) at least one of conditions expressed by

(a) $S1/L11 > 0.6$

(b) $(S1 + S2)/L2n < 1$

(c) $\Delta SL > 0.6$

wherein S1 is the distance from the point of emergence on the first optical system to the point of incidence on the second optical system along the first reference axis;

wherein S2 is the distance from the point of emergence on the second optical system to the conjugate plane B along the second reference axis;

wherein the maximum and minimum of the distance between a point of convergence in the first and second light beam cross sections of a light beam emerging from the first optical system at a point nearest to the first reference axis and the point of emergence on the first optical system are L11 and L21, respectively;

wherein the maximum and minimum of the distance between the point of convergence in the first and second light beam cross sections of a light beam emerging from the first optical system at a point remotest from the first reference axis and the point of emergence on the first optical system are L1n and L2n, respectively;

wherein D1 is the distance along an arbitrary light beam from the first optical system to the second optical system;

wherein D2 is the distance along the arbitrary light beam from the second optical system to the conjugate plane B; and

wherein ΔSL is the difference between the maximum and minimum of the ratio S1/L1 of the distance L1 and the distance S1.

19. (New) The image optical system according to claim 11, wherein the first and second optical systems have an imaging function of forming on the conjugate plane A a reduced image approximately similar to an image on the conjugate plane B.

20. (New) The image optical system according to claim 12, wherein the first and second optical systems have an imaging function of forming on the conjugate plane A a reduced image approximately similar to an image on the conjugate plane B.

21. (New) The image optical system according to claim 13, wherein the first and second optical systems have an imaging function of forming on the conjugate plane A a reduced image approximately similar to an image on the conjugate plane B.

22. (New) The image optical system according to claim 14, wherein the first and second optical systems have an imaging function of forming on the conjugate plane A a reduced image approximately similar to an image on the conjugate plane B.

23. (New) The image optical system according to claim 15, wherein the first and second optical systems have an imaging function of forming on the conjugate plane A a reduced image approximately similar to an image on the conjugate plane B.

24. (New) The image optical system according to claim 16, wherein the first and second optical systems have an imaging function of forming on the conjugate plane A a reduced image approximately similar to an image on the conjugate plane B.

25. (New) The image optical system according to claim 17, wherein the first and second optical systems have an imaging function of forming on the conjugate plane A a reduced image approximately similar to an image on the conjugate plane B.

26. (New) The image optical system according to claim 18, wherein the first and second optical systems have an imaging function of forming on the conjugate plane A a reduced image approximately similar to an image on the conjugate plane B.

27. (New) The image optical system according to claim 11, wherein the first optical system consist of refracting optical elements and the second optical system consist of reflecting optical elements.

28. (New) The image optical system according to claim 12, wherein the first optical system consist of refracting optical elements and the second optical system consist of reflecting optical elements.

29. (New) The image optical system according to claim 13, wherein the first optical system consist of refracting optical elements and the second optical system consist of reflecting optical elements.

30. (New) The image optical system according to claim 14, wherein the first optical system consist of refracting optical elements and the second optical system consist of reflecting optical elements.

31. (New) The image optical system according to claim 15, wherein the first optical system consist of refracting optical elements and the second optical system consist of reflecting optical elements.

32. (New) The image optical system according to claim 16, wherein the first optical system consist of refracting optical elements and the second optical system consist of reflecting optical elements.

33. (New) The image optical system according to claim 17, wherein the first optical system consist of refracting optical elements and the second optical system consist of reflecting optical elements.

34. (New) The image optical system according to claim 18, wherein the first optical system consist of refracting optical elements and the second optical system consist of reflecting optical elements.

35. (New) The image optical system according to claim 11, wherein the first optical system consist of reflecting optical elements and the second optical system consist of refracting optical elements.

36. (New) The image optical system according to claim 12, wherein the first optical system consist of reflecting optical elements and the second optical system consist of refracting optical elements.

37. (New) The image optical system according to claim 13, wherein the first optical system consist of reflecting optical elements and the second optical system consist of refracting optical elements.

38. (New) The image optical system according to claim 14, wherein the first optical system consist of reflecting optical elements and the second optical system consist of refracting optical elements.

39. (New) The image optical system according to claim 15, wherein the first optical system consist of reflecting optical elements and the second optical system consist of refracting optical elements.

40. (New) The image optical system according to claim 16, wherein the first optical system consist of reflecting optical elements and the second optical system consist of refracting optical elements.

41. (New) The image optical system according to claim 17, wherein the first optical system consist of reflecting optical elements and the second optical system consist of refracting optical elements.

42. (New) The image optical system according to claim 18, wherein the first optical system consist of reflecting optical elements and the second optical system consist of refracting optical elements.

43. (New) The image optical system according to claim 11, wherein the first optical system and the second optical system consist of reflecting optical elements.

44. (New) The image optical system according to claim 12, wherein the first optical system and the second optical system consist of reflecting optical elements.

45. (New) The image optical system according to claim 13, wherein the first optical system and the second optical system consist of reflecting optical elements.

46. (New) The image optical system according to claim 14, wherein the first optical system and the second optical system consist of reflecting optical elements.

47. (New) The image optical system according to claim 15, wherein the first optical system and the second optical system consist of reflecting optical elements.

48. (New) The image optical system according to claim 16, wherein the first optical system and the second optical system consist of reflecting optical elements.

49. (New) The image optical system according to claim 17, wherein the first optical system and the second optical system consist of reflecting optical elements.

50. (New) The image optical system according to claim 18, wherein the first optical system and the second optical system consist of reflecting optical elements.

51. (New) The image optical system according to claim 11, wherein all the light beams incident on the conjugate plane B are inclined at angles not smaller than 45° to a normal to the conjugate plane B.

52. (New) The image optical system according to claim 12, wherein all the light beams incident on the conjugate plane B are inclined at angles not smaller than 45° to a normal to the conjugate plane B.

53. (New) The image optical system according to claim 13, wherein all the light beams incident on the conjugate plane B are inclined at angles not smaller than 45° to a normal to the conjugate plane B.

54. (New) The image optical system according to claim 14, wherein all the light beams incident on the conjugate plane B are inclined at angles not smaller than 45° to a normal to the conjugate plane B.

55. (New) The image optical system according to claim 15, wherein all the light beams incident on the conjugate plane B are inclined at angles not smaller than 45° to a normal to the conjugate plane B.

56. (New) The image optical system according to claim 16, wherein all the light beams incident on the conjugate plane B are inclined at angles not smaller than 45° to a normal to the conjugate plane B.

57. (New) The image optical system according to claim 17, wherein all the light beams incident on the conjugate plane B are inclined at angles not smaller than 45° to a normal to the conjugate plane B.

58. (New) The image optical system according to claim 18, wherein all the light beams incident on the conjugate plane B are inclined at angles not smaller than 45° to a normal to the conjugate plane B.

59. (New) The image optical system according to claim 11, wherein the second optical system consist of a single optical element.

60. (New) The image optical system according to claim 12, wherein the second optical system consist of a single optical element.

61. (New) The image optical system according to claim 13, wherein the second optical system consist of a single optical element.

62. (New) The image optical system according to claim 14, wherein the second optical system consist of a single optical element.

63. (New) The image optical system according to claim 15, wherein the second optical system consist of a single optical element.

64. (New) The image optical system according to claim 16, wherein the second optical system consist of a single optical element.

65. (New) The image optical system according to claim 17, wherein the second optical system consist of a single optical element.

66. (New) The image optical system according to claim 18, wherein the second optical system consist of a single optical element.

67. (New) The image optical system according to claim 11, wherein the second optical system consist of a single reflecting optical element.

68. (New) The image optical system according to claim 12, wherein the second optical system consist of a single reflecting optical element.

69. (New) The image optical system according to claim 13, wherein the second optical system consist of a single reflecting optical element.

70. (New) The image optical system according to claim 14, wherein the second optical system consist of a single reflecting optical element.

71. (New) The image optical system according to claim 15, wherein the second optical system consist of a single reflecting optical element.

72. (New) The image optical system according to claim 16, wherein the second optical system consist of a single reflecting optical element.

73. (New) The image optical system according to claim 17, wherein the second optical system consist of a single reflecting optical element.

74. (New) The image optical system according to claim 18, wherein the second optical system consist of a single reflecting optical element.

75. (New) The image optical system according to claim 11, wherein the second optical system has an optical element having a axis of rotation symmetry and having the function of converging light beams passing through the first optical system on the conjugate plane B.

76. (New) The image optical system according to claim 12, wherein the second optical system has an optical element having a axis of rotation symmetry and having the function of converging light beams passing through the first optical system on the conjugate plane B.

77. (New) The image optical system according to claim 13, wherein the second optical system has an optical element having a axis of rotation symmetry and having the function of converging light beams passing through the first optical system on the conjugate plane B.

78. (New) The image optical system according to claim 14, wherein the second optical system has an optical element having a axis of rotation symmetry and having the function of converging light beams passing through the first optical system on the conjugate plane B.

79. (New) The image optical system according to claim 15, wherein the second optical system has an optical element having a axis of rotation symmetry and having the function of converging light beams passing through the first optical system on the conjugate plane B.

80. (New) The image optical system according to claim 16, wherein the second optical system has an optical element having a axis of rotation symmetry and having the function of converging light beams passing through the first optical system on the conjugate plane B.

81. (New) The image optical system according to claim 17, wherein the second optical system has an optical element having a axis of rotation symmetry and having the function of converging light beams passing through the first optical system on the conjugate plane B.

82. (New) The image optical system according to claim 18, wherein the second optical system has an optical element having a axis of rotation symmetry and having the function of converging light beams passing through the first optical system on the conjugate plane B.

83. (New) The image optical system according to claim 11, wherein the second optical system has an optical element having a free-form surface and having the function of converging light beams passing through the first optical system on the conjugate plane B.

84. (New) The image optical system according to claim 12, wherein the second optical system has an optical element having a free-form surface and having the function of converging light beams passing through the first optical system on the conjugate plane B.

85. (New) The image optical system according to claim 13, wherein the second optical system has an optical element having a free-form surface and having the function of converging light beams passing through the first optical system on the conjugate plane B.

86. (New) The image optical system according to claim 14, wherein the second optical system has an optical element having a free-form surface and having the function of converging light beams passing through the first optical system on the conjugate plane B.

87. (New) The image optical system according to claim 15, wherein the second optical system has an optical element having a free-form surface and having the function of converging light beams passing through the first optical system on the conjugate plane B.

88. (New) The image optical system according to claim 16, wherein the second optical system has an optical element having a free-form surface and having the function of converging light beams passing through the first optical system on the conjugate plane B.

89. (New) The image optical system according to claim 17, wherein the second optical system has an optical element having a free-form surface and having the function of converging light beams passing through the first optical system on the conjugate plane B.

90. (New) The image optical system according to claim 18, wherein the second optical system has an optical element having a free-form surface and having the function of converging light beams passing through the first optical system on the conjugate plane B.